REMARKS

In view of the above amendments and following remarks, reconsideration of the objections and rejections that are contained in the Office Action of December 31, 2009 is respectfully requested.

Formal Matters

Initially, it is noted that the Examiner objected to the reference to the claims in the specification. The references to the claims have accordingly been deleted from the specification. In addition, a number of further changes have been made to the specification for the sake of improving the form as well as complying with preferred U.S. format.

The Examiner further objected to the diagrams on pages 3 and 4, noting that they should be presented as drawings. Accordingly, these graphs have been deleted from the specification and presented as new drawings Figs. 3 and 4.

The Examiner rejected claims 7-10 and 13-24 as being indefinite for a number of statements deemed not to have antecedent basis. Without necessarily agreeing with the positions taken by the Examiner, the claims rejected by the Examiner have either been canceled without prejudice or amended to remove the antecedent basis concern expressed by the Examiner.

The Examiner also rejected claims 7-10 and 13-24 as being unpatentable over Averill, U.S. Patent 1,617,739, in view of Robertson, U.S. Patent 4,481,130. However, it is respectfully submitted that the present invention, as set forth in the above previously submitted and newly submitted claims, clearly patentably defines over Averill and Robertson.

As noted above, claims 7-10 and 13-15 have now been canceled without prejudice. Claim 16 has been amended to address the formal matters raised by the Examiner and to remove the reference numbers in the claim. However, the substantive limitations thereof remain the same. Minor changes have also been to claims 17, 19-21 and 23. A new set of claims, claims 25-33, has also been added; this new set of claims corresponds substantially to claims 16-24, but has been presented in a different format. All of these claims define over Averill and Robertson.

The present invention is generally directed to a method for the separation of a fluid that includes oil and water, in connection with the extraction of such fluid from formations under the

surface of the earth or the sea bed. The method uses a separator, which can be in the form of a tubular separator body or a gravitation tank or the like.

Adding water to the oil/water fluid prior to separation will improve the oil/water separation in certain situations. Also, by subjecting the fluid to shear forces prior to separation, a faster phase inversion can be achieved, that is, a faster transition from the initial fluid, consisting of a mixture of water that is dispersed in an oil phase, to separate layers of water and oil. However, when this has been done by adding water directly to the fluid as illustrated in Fig. 1, tests have shown that the effect is unstable and unreliable, and no positive effect has generally been achieved.

However, by subjecting the fluid to shear forces, for example by the use of a phase inversion stabilizer, in the transport pipe upstream of the separator (see phase inversion device upstream of separator 1 in Fig. 2), the effect of using recirculated water on the oil/water separation became stable and reliable. The shear forces, further, must be high enough to ensure that the drops in the supply of flow are torn up to form new drops so that their interface generally becomes new and uncontaminated by surfactants, which are always present in crude oil systems. The new interface is therefore very unstable, and the drops will begin a strong and intense coalescence process that leads to phase inversion.

When a large drop is torn up into smaller drops, the surface area between the oil and the water increases. When torn up to just a third of their original diameter, the new drops will be unstable and the phase inversion stabilizer will have an effect.

Thus, the present invention resides, at least partly, in the realization that it is advantageous to decrease the size of the droplets to less than a third of their original diameter. This is because the interface at this point generally becomes new and uncontaminated by surfactants, providing an improved and more effective separation of oil and water and allowing the phase inversion stabilizer to work more effectively.

Independent claim 16 reflects the present invention, including the requirement of subjecting the fluid upstream of the separator to shear forces so that drops in the fluid are torn up to form new drops that have a diameter that is less than a third of their original diameter, and so small that an interface of the drops generally becomes new and uncontaminated by surfactants. Neither Averill

nor Robertson, the references cited by the Examiner, teach, suggest or provide any reason or indication that it could or would be advantageous to decrease the drop size to such an extent that the interface generally becomes new and uncontaminated by surfactants.

In the rejection, Averill is cited as disclosing a method for separating a fluid including oil and water. The Examiner cites an emulsifying device where valve H in Averill is subjecting the emulsion and the water to vigorous agitation. As noted by the Examiner, however, Averill fails to disclose or suggest subjecting fluid upstream of the separator to *shear forces*, simply teaching that the fluid should be agitated. As also implicitly acknowledged by the Examiner, Averill also fails to disclose or suggest that the drops could or would be torn up so as to form new drops that have a diameter that is less than a third of their original diameter, and that are so small that an interface generally becomes new and uncontaminated by a surfactants.

Robertson is cited as disclosing the subjecting of a water-in-oil emulsion to high shear rates in order to aid dispersion of a de-emulsifier in the emulsion. The Examiner concludes that it would have been obvious to a person of skill in the art to modify Averill by the teachings of Robertson so as to arrive at the present invention.

However, Robertson does not disclose using shear forces to tear up the droplets so as to form new droplets so as to decrease the size of the droplets so that their interface generally becomes new and uncontaminated by surfactants. Robertson further fails to disclose that any such droplets should or would have a diameter that is less than a third of their original diameter.

The Examiner takes the position that the specific diameter of the drops formed is an obvious matter of process optimization to one of skill in the art, depending on the specific fluid separated and the results desired, absent a sufficient showing of unexpected results. This position by the Examiner is respectfully traversed.

As noted above, the present invention lies at least in part in the realization of the advantage to decrease the size of droplets to the claimed extent, i.e. to less than a third of their original diameter, because the interface then generally becomes new and uncontaminated by surfactants. This provides the improved and more effective separation of the oil and water, and allows the phase inversion stabilizer to work more effectively, as previously noted.

Neither Averill nor Robertson recognizes the importance of the size of the droplets, i.e. that reducing the size of the droplets to less than a third of their original size is important, or even that the size of the droplets is a parameter that has any effect. Neither Averill nor Robertson recognizes that such a decrease in drop size to less than a third results in the interface then generally becoming new and uncontaminated by surfactants.

It may be obvious to one of ordinary skill in the art to optimize a particular known result-effective parameter. However, **when the prior art does not recognize a parameter as being a result-effective parameter, then such optimization is not obvious**. The Examiner's attention is drawn to the case of *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). In that case, a claim to waste water treatment device had a tank volume to contractor area of 0.12 gal./sq. ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result-effective variable. Thus, this case stands for the proposition that a particular parameter must first be recognized as a result-effective variable before a determination of the optimum or workable ranges of the variable might be characterized as routine experimentation or optimization. In the present situation, the prior art clearly does not recognize the drop size as a result-effective parameter. Accordingly, **under the law of *In re Antonie*, it cannot be an obvious matter of process optimization to one of skill in the art to subject the fluid to shear forces so that the drops of the fluid are torn up to form new drops that have a diameter that is less than a third of their original diameter and so small that an interface of the new drops generally becomes new and uncontaminated by surfactants.**

Thus, from the above it is respectfully submitted that the Examiner has failed to present the *prima facie* case of obviousness with respect to independent claim 16. New independent claim 25 includes the same limitations as claim 16 with respect to the drop size. Accordingly, claim 25 and its dependent claims also clearly defines over the prior art that has been cited by the Examiner.

In view of the above indication of the patentability of all of the claims that are now pending in the application is requested.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the

Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicants' undersigned representative.

Respectfully submitted,

Per GRAMME et al.

/Nils E. Pedersen/

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